



WIND TURBINE FIRE PROTECTION

MINIMAX

The generation of electricity from wind energy has become a major technology as countries continue to develop alternative energy sources. Today's highly efficient wind power stations, including offshore installations, require considerable financial investment that must be protected against downtime and possible loss. Until recently, manufacturers, operators and firefighters were unable to reduce the risk of damage by fire.



Fire – An Underestimated Risk

The nacelle, recognized as the heart of a wind turbine, contains essential elements such as the generator, gearbox, brakes, control panels, transformer and converter. If a fire breaks out as a result of overheated components, electrical faults or lightning strikes, the fire can spread easily because the nacelle contains combustible

materials, including mineral oils, lubricants, plastics and electrical components.

Due to the remote location of most wind turbines, effective intervention can be

hampered by long emergency response times. In addition, extreme hub heights often prevent fire fighters from gaining access to the fire. The result is often total loss of the unit and considerable economic consequences for operators, manufacturers and insurance carriers.

Minimax, the market leader in fire protection solutions, has developed effective systems specifically designed for wind turbines, based on proven and tested components. Minimax systems detect a fire at an early stage and extinguish it automatically, minimizing downtimes and damage to the equipment.



Early Detection is Essential

Automatic gas, smoke or heat detectors installed at the relevant critical locations detect a fire at a very early stage. As soon as a detector is triggered, the control panel immediately shuts down the wind turbine and initiates a sequence of pre-programmed procedures. Plus, a number of manual call points are located in the wind turbine.

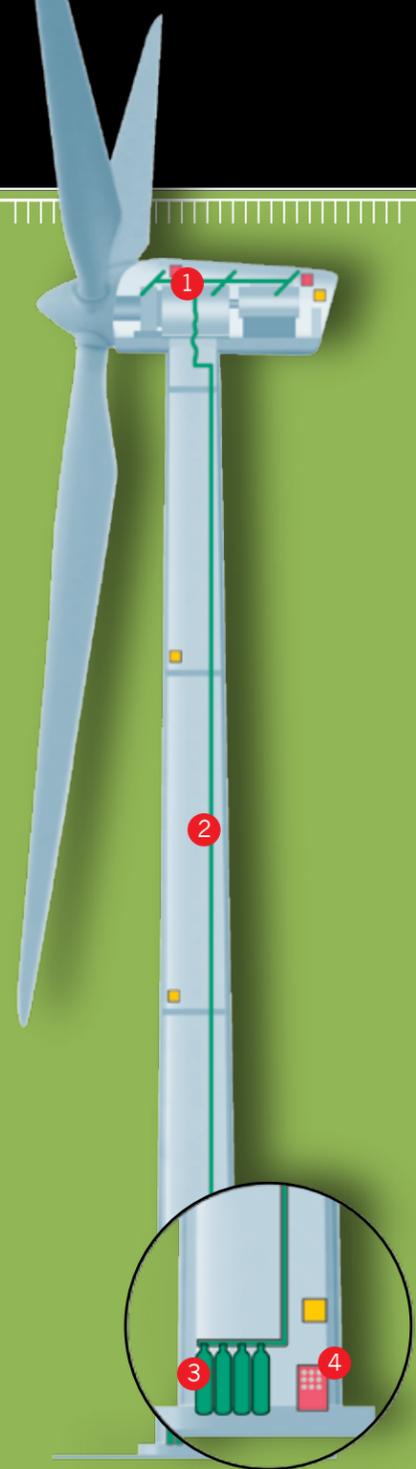
Gas Extinguishing Systems

Clean agent extinguishing systems from Minimax are the ideal solution for wind turbines. In the event of a fire, nitrogen reduces the oxygen in the air, necessary for each combustion process, and extinguishes the fire quickly and without leaving any residue behind.

The adjacent illustration outlines the main components of the fire protection system and their ideal location in the turbine:

1. System piping with extinguishing nozzles in the nacelle and electrical devices
2. Supply pipe to the nacelle
3. Nitrogen cylinder bank at the base of the tower
4. Fire detection control panel

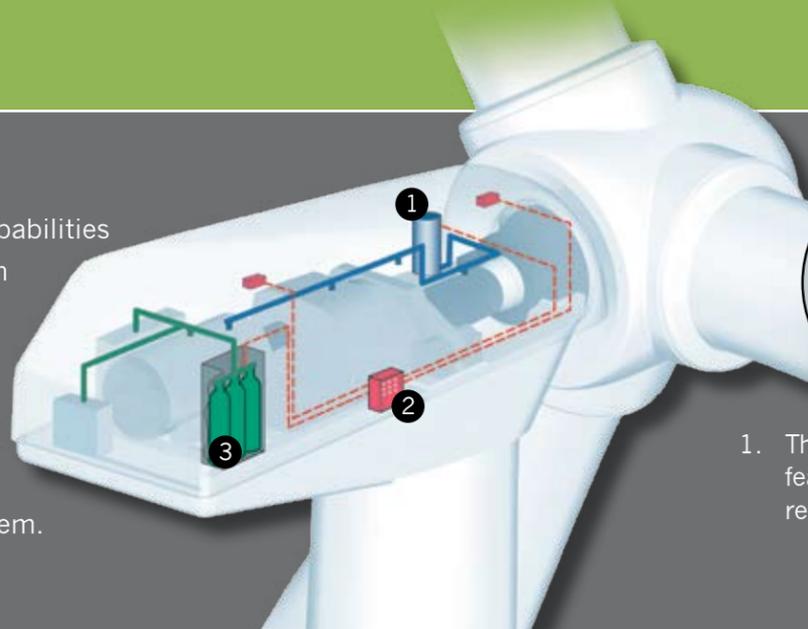
- Automatic fire detectors
- Manual release for the nitrogen extinguishing system



Minifog Systems

Minifog fine water spray systems combine excellent fire fighting capabilities with a minimum discharge of water. Minifog nozzles are installed in such a way that crucial components such as main bearings, gear systems, brakes and generators are effectively protected.

While a Minifog fine water spray system protects the mechanical components in the nacelle, the electrical and electronic control cabinets of the wind turbine are safeguarded by a clean agent system.



1. The Minifog water supply unit features a compact design that requires minimum space



2. The fire detection control panel monitors and controls the attached automatic extinguishing systems



3. The clean agent extinguishing system's nitrogen gas cylinders are pressurized so that the weight and space requirements are minimized

Wind Turbine Operators Prefer Minimax

The world's leading wind turbine operators rely on Minimax to prevent fire damage and the resulting economic consequences. Minimax offers wind turbine operators and their constituencies several distinct advantages:

- Proven reduction of risks and damage with Minimax automatic fire protection systems
- Production optimization, as the risk of fire and serious damage is minimized
- In the event of a fire, downtimes are minimized
- Protection of the investment in facilities, equipment and personnel
- Stronger position for negotiations with insurance companies and banks
- Fulfilling corporate responsibilities by protecting the environment

Safety Through Technology

Minimax has been one of the leading companies in fire protection for over 100 years. Our leadership in many market sectors is driven by our commitment to technology. Minimax utilizes its own fire research center to complete intensive development work to design innovative products for increasingly complex situations.

Wherever there is a fire risk – in data centers, power stations, steel mills, marine vessels, industrial facilities, paper mills, wind turbines, and automobile painting facilities – Minimax is there, protecting people, machines, buildings and the environment. Rely on Minimax to provide safety through technology.



Fire Sprinkler

Fire Suppression

Fire Alarm & Detection

Design

Fabrication & Installation

Service & Maintenance



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